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ARAUJIA ALBENS AS A MOTH-TRAP.

BY ROBERT E. C. STEARNS.[1]

THE plant which I have to notice because of its peculiarity as an insect-trap, rather than on account of its botanical aspect or relations, is referred by botanists to the order Asclepiadaceæ. This order includes the so-called Milk-Weeds, as well as a great number of other curious, interesting, and economically important forms.

The species under consideration—formerly *Physianthus*, now *Araujia albens*—is a native of Buenos Ayres; it has been pretty widely distributed. Its rapid growth, hardy habit, and clean, shining leaves have made it a favorite for ornamental purposes where an attractive, quickly-spreading vine is desired. It has been introduced into this country, to the East and North, in the vicinity of Boston, in Massachusetts, and as far west as the neighborhood of San Francisco, in California. It appears to thrive equally well in these widely remote regions.

In November, 1880, I noticed, one day, three or four moths fluttering in rather a peculiar way upon or around the blossoms of a large *Araujia* vine that covered one side of the porch of my house, in Berkeley, California. I found, upon closer examination, that they were fastened to the flowers, and, upon still more careful scrutiny, that the proboscis was, in each case, submerged in the flower, and the end of it hidden in the interior of the blossom. Besides the living moths, there were several dead ones

[1] Read before the Biological Society, Washington, D. C., February 19, 1887.

attached to other blossoms. Knowing that many of the plants of the family to which *Araujia* belongs are poisonous, my first thought was that the moths attached to the blossoms, living and dead, were intoxicated or had been poisoned by some peculiar property of the nectar.

Physianthus, or *Araujia*, as a moth-trap had long before been observed and made known, though I was not aware of it. The matter, however, was new to me, and the investigation full of interest, and an ample reward for the trouble. My curiosity was again revived the following year, upon what may be called the recurrence of the late moth season; and further investigations followed it.

My note-book about this time reads: "Saturday, November 5, 1881, detected the first entrapped moths of the (second) season, *nine* in number; some dead, others apparently just caught. Sunday, November 6, eight or nine more; some just alive, others just caught. This morning (Monday, November 7), five more. Tuesday, November 8, a windy and cold day, two. Wednesday, November 9, windy and cold, two;" and so on.

The trapping seasons—for there appear to be *two*—occur in August and November. It may be that there are *two* flights of the principal species of moths that frequent these flowers,—one, the first in early autumn, with apparently a gap; then again, the second and last flight, as indicated, later in the year.

My note-book shows that in the summer of 1883 the first flowers on my *Araujia* vine opened about August 19, and the first trapping of the season—a *bee*—occurred on the following 24th day of said month. August 25, a moth; the 26th, two moths, etc.

The plant continues to bloom for some time after the flights of the moths have ceased, though the number of the flowers gradually decreases with the closing of the autumnal season.

On turning to the figure of the flower it will be noticed that it is trumpet-shaped, flaring at the mouth, where the petals divide, then uniting and forming a tube, which is swollen into a bulbous form where the corolla joins the calyx. Now, this enclosing tube being pulled off, we are able to see the stamens with the side wing-like processes and the exterior spurs pressing against the gymnecium and hiding the ovaries and pollen-masses, as heretofore represented in the figures. The moth, in pursuit of

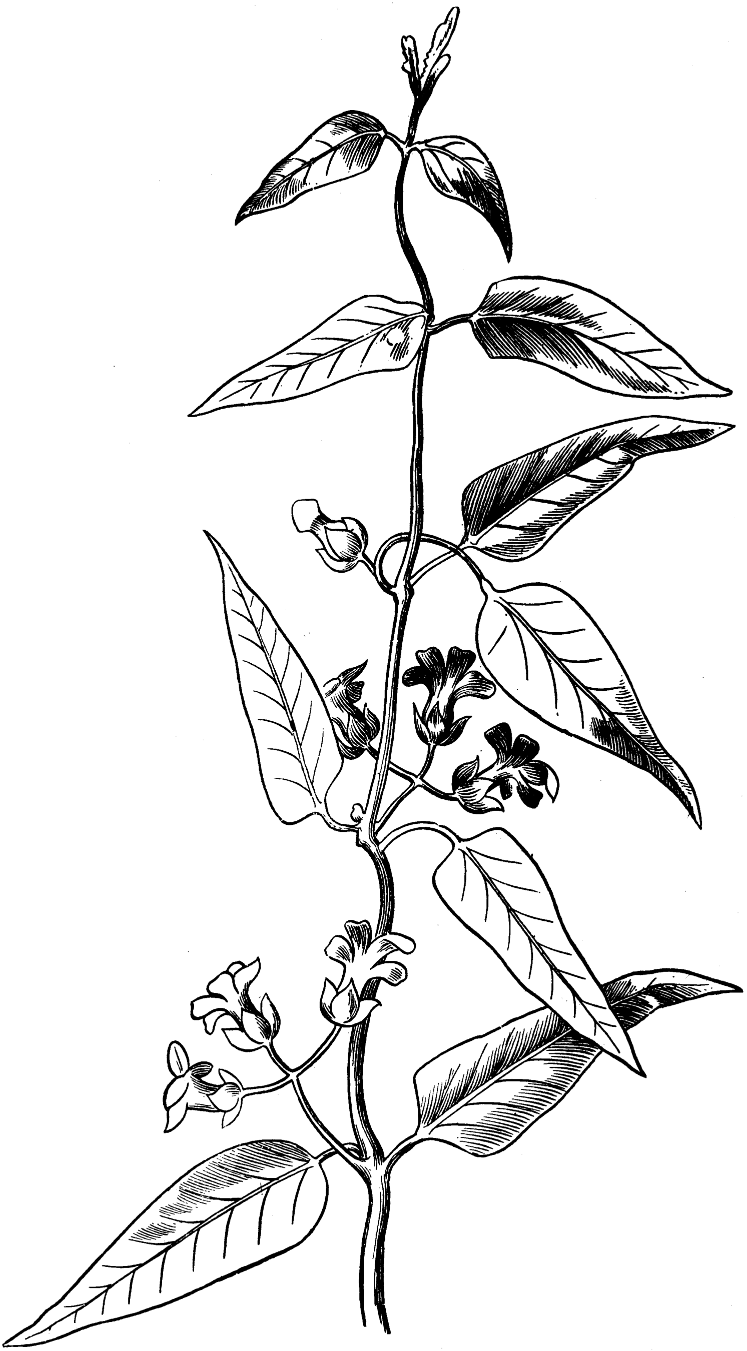

Fig. 1.

the nectar, first reaches that portion contained in the pockets between the bases of the spurs; then in search of more, having already thrust the proboscis down the tube of the flower, describing a curve between the exterior of the stamineal crown or mass and the inside of the bulb of the perigonium, it then has to push the proboscis upward in order to reach that portion of the flower where the anther-cells, pollen-masses, and glands are in close juxtaposition. Having satisfied its hunger, or otherwise, upon attempting to withdraw the proboscis, as the moth can only make a direct pull, it (the proboscis) not being provided with any muscular arrangement by which the curved motion made in entering, as just described, can be reversed,—to repeat: upon attempting to withdraw its proboscis, *by a direct pull*, it becomes wedged in between the edges of what may be termed the anther-wings, or, rather, the edges thereof, and is held tight, very much in the same way that an old-fashioned boot-jack grips a boot. The more the moth pulls, the tighter or firmer the grip, and escape is impossible, unless the flower has reached such a degree of maturity that its substance has become somewhat softened or wilted.

DESCRIPTION OF FIGURES.

In Fig. 1 we have a spray of *Physianthus*, or *Araujia*, which gives an idea of the general form of the plant, its leaves and flowers.

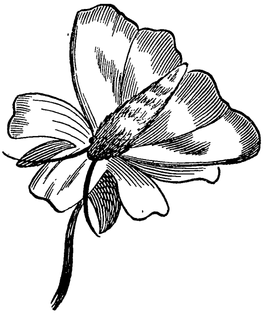

FIG. 2.

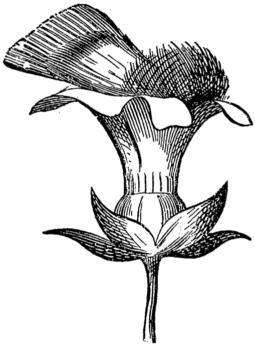

FIG. 3.

In Figs. 2 and 3, a flower, each with a moth upon it, showing a back- and side-view of the insect in repose.

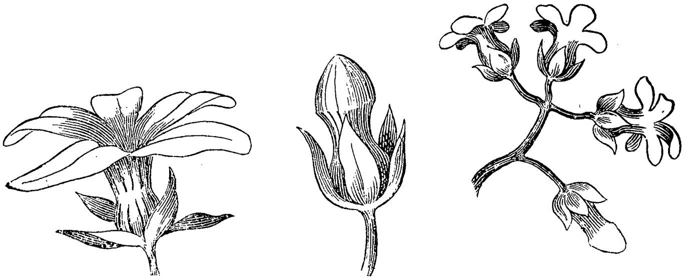

FIG. 4.

In Fig. 4, the perianthum or perigonium, constituting a single flower or blossom.

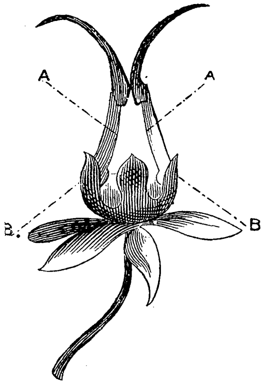

FIG. 5.

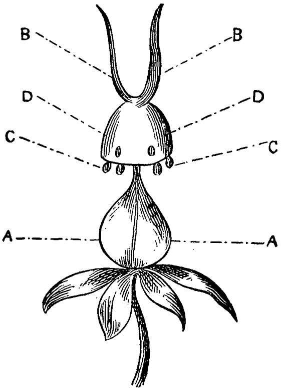

FIG. 6.

In Fig. 5, the stamineal mass or corona-staminea: A, anther-wings; B, exterior spur-like processes to stamen.

Fig. 6, gymnecium, showing ovaries, A; stigma, B; pollen-masses, C; and glands, D.

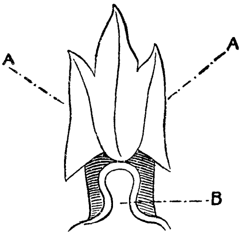

FIG. 7.

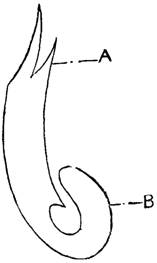

FIG. 8.

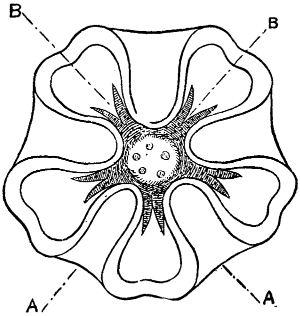

FIG. 9.

Fig. 7, stamen, showing wing-like processes, A, A, and exterior spur, B.

In Fig. 8 a side-view of the stamen figured in 7 is shown. A, A, side-views of wings; B, spur.

Fig. 9, oral view, showing how the spurs A, A, A, A, A head in against the wings B, B, the upper edges of which are seen in pairs, B, B.

The riper flowers, apparently, are not sought by the moths; probably the tempting nectar has lost its sweetness or *bouquet*, or, perhaps, in some way has become changed, or, may be, has been absorbed by the flower in the process of ripening. I have in several instances plucked flowers to which living moths were attached, and have pinned such flowers to the floor of an insect-box, and subsequently found that the moths had freed themselves. The tissues of the flower begin to soften and wilt very soon after separation from the plant. In cases where the moths had freed themselves as above, they seldom lived many hours, and appeared to have died from exhaustion caused by their efforts to escape. As between the moth and the flower, the release or death of the former seems to be reduced to the single point, namely, whether the moth or the flower has the greater vitality.

As some plants are exceedingly sensitive, I thought it possible that the flowers of *Araujia* might be so. I accordingly experimented with a bristle, to learn whether the rigidity of the anther-wings might not be owing to irritability caused by the proboscis of the moth, but was unable to detect any effect of this kind as resulting from friction. By following the same movement or curve that a moth has to follow with its proboscis in reaching up towards the more interior structure of the flower, and then following the further motion that is made by the moth when it tries to withdraw its proboscis, my bristle was held fast between the edges of the wing-like extensions, the same as is the proboscis of a captured moth.

As pertaining to the foregoing remarks, I will mention the following species of Lepidoptera, etc., as determined by various entomological friends, taken by me during three seasons—1880–83—from the blossoms of *Araujia:*

Colias chrysotheme var., *Colias kewaydin*, *Pamphila sylvanus*, *Pyrameis caryæ*, *Pyrameis hunteri*, *Pyrgus syrictus*, *Syrichthus tessellatus*, *Plusia pasiphæia*, *Plusia gamma*, *Agrotis c-nigrum*, *Heliothis* sp.

Other insects are often found upon or within the flowers, such as bees, ants, and beetles, but seldom as prisoners. Among the latter the little (beetle) *Throscus sericeus* Le Conte was detected.

Of the species above named, probably two-thirds of the lepidopterous forms that are caught belong to the three species *Plusia pasiphæia*, *Plusia gamma*, and *Agrotis c-nigrum*.

The list I have submitted contains *eleven* species, as named.

The species of moth which is most frequently trapped on this side of the continent, I have been told, is *Plusia precationis*. It will be noticed that two species of this genus are included in my California list.

As to the simple, ingenious, and effective mechanism exhibited in the structure of the flowers of *Araujia*, whether the same is a device of nature to insure fertilization, through the agency or assistance of the insects it catches, and consequent perpetuation of this plant species, is a question I am unable to answer. Upon the theory of utility, we can hardly conceive of its being without a purpose, or that the peculiar phenomena of plant and insect association in the instance before us are without function, aim, or result, other than the trapping of the insects before mentioned.

BIOLOGICAL INSTRUCTION IN UNIVERSITIES.[1]

BY C. O. WHITMAN.[2]

THE discussion of biological instruction in relation to universities would seem properly to fall to those whose professional standing and experience lend weight to their words; but there are some aspects of the question which lie open to all whose connections with university life have been such as to afford more or less varied opportunities for observation and reflection.

At our last annual meeting Prof. Farlow discussed the question in relation to elementary instruction in colleges and schools. It was made very clear that "*the college instructor must still regard the student who studies under him as a school-boy whose capacity for observing and investigating natural objects has been blunted by a one-sided course of instruction at school.*" The charge is a most grave and startling one; but I think no one would venture to question its entire justice.

We know exactly where the evil lies, but I think the remedy is too generally sought in the wrong direction. It is, in my opinion, a great mistake to suppose that it lies within the power of

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[1] Read before the American Society of Naturalists, December 29, 1886.

[2] Director of the Lake Laboratory, Milwaukee.